Capt. David Whittaker (center), U.S. Navy Bureau of Medicine and Surgery, addresses military and civilian professionals Feb. 15 during a panel discussion at the 21st Century Battlefield Medical Care Symposium, held at Marine Corps Base Quantico. (U.S. Navy photo by Mass Communication Specialist 1st Class John Paul Kotara II/released)

FUTURE CHALLENGES AND DEVELOPING SOLUTIONS IN BATTLEFIELD MEDICAL CARE

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Editor's note: More than 300 military and civilian professionals met Feb. 14-15 at Marine Corps Base Quantico for the 21st Century Battlefield Medical Care Symposium, which explored past battlefield medical experiences and promising new ideas and technology to improve the treatment and movement of casualties in future distributed operational environments. Vice Adm. Forrest Faison, Navy surgeon general and chief, U.S. Navy Bureau of Medicine and Surgery (BUMED), Lt. Gen. Michael Dana, deputy commandant, Installations and Logistics, and Rear Adm. Gayle Shaffer, medical officer of the Marine Corps, co-hosted the symposium.

CAPT David Whittaker is a physician who presented his thoughts during a panel on emerging medical technologies and future battlefield care. The following blog outlines Whittaker's assessment of potential challenges in battlefield care, and the solutions that Navy Medicine are pursuing.

In WWII there were more than 291,000 American deaths and more than 671,000 Americans wounded in action. Seventy years later, is the U.S. any better situated to handle this volume of casualties? Although

medicine has made significant advances in the management of chronic and debilitating disease processes, traumatic injuries continue to represent a quixotic balance between basic physiology and time.

Tourniquet utilization, stabilization by Forward Surgical Teams, and immediate evacuation of wounded sailors and soldiers to higher levels of care have enabled the Military Health System (MHS) to demonstrate individual survival rates exceeding 90% if the wounded member was able to make it to a higher level of care. In some situations, the survival rate was as high as 97%.

So what does the future hold for battlefield medicine? How can we maintain readiness and survival rates? Emerging weapon technologies open new windows into medical-care requirements. We must advance medical-care requirements at the same rate as emerging weapon technologies.

Future battlefield environments are another area of growth and learning. The USMC Futures Directorate regularly publishes its Security Environment Forecast. Different environments present unique challenges as it relates to battlefield medicine. For example, an urban battlefield is much different than a mountainous battlefield. Distinguishing the needs for various environments will be a critical element in maintaining future readiness.

The futurespace for battlefield medicine is vast.

If you ever have a chance to observe a trauma center in action, you will see the numbing effect of scale on a finely tuned system. With the first patient, a team of highly trained professionals surrounds the patient and optimizes every aspect of survival at once. Bring in more patients, and the team of highly-trained professionals is forced to divide and triage appropriately. No simple task. Do you remember the paralyzed feeling experienced by Scarlett O'Hara in the Battle of Atlanta scene from *Gone With The Wind* (1939)? This battle resulted in 8,000 Confederate casualties. Compare this to the Battle of the Bulge with its 19,000 American deaths. Or, Normandy with its gut-wrenching 34,000 Allied deaths. These numbers pale in comparison to the total number of injuries and the following disease and non-battle injuries that occurred.

The scale of injuries is a source of concern for any medical provider. Decreasing the quality of care is not an option. Technology is advancing faster than ever, and will play a very necessary and significant role in the future of battlefield medicine.

Our Military Health System has grown from the past decade of war. We have gained experience with the deleterious effects of over-use injuries and heat-exhaustion, and we have identified the initial steps in the management of head-injuries and limb preservation. As a healthcare enterprise, we have developed sophisticated algorithms for the care and recovery of the severely injured soldier.

However, we must continue to work toward innovative solutions in battlefield medical care.

Machine learning and artificial intelligence offer a tremendous opportunity to address the scale of battlefield medicine's challenges. Autonomous systems that are capable of guiding providers of various skillsets or even directly providing care are no longer the topics of pure science-fiction. Our understanding of biologic processes also continues to expand at a rapid rate. This explosive growth in science and research raises the possibility of wide-spread advances in tissue-engineering, pre-emptive and reactive therapeutics and genetic modifications. But the guiding principle for every aspect of battlefield medicine – injury prevention, trauma resuscitation, injury recovery – must be its over-arching mission: Optimization of the Fighting Force.

"Wars may be fought with weapons, but they are won by men." –General George S. Patton